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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,878	08/22/2003	CENGIZ ESMERSOY	20.2797	1877

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EXAMINER	
HUGHES, SCOTT A	

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/604,878	ESMERSOY ET AL.	
	Examiner	Art Unit	
	Scott A Hughes	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/2/05, 6/24/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-16 and 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klaveness in view of Shook.

With regard to claim 1, Klaveness discloses a method of estimating velocity ahead of a drill bit disposed in a subsurface formation (abstract; Column 23, Lines 52-68) (Fig. 6). Klaveness discloses generating seismic waves in the borehole and receiving these seismic waves at the surface (Fig. 1) (Column 2; Column 7, Lines 15-30; Column 9). Klaveness discloses determining travel times of the seismic waves received at the one more locations (Column 2; Column 7, Lines 15-30; Column 9, Lines 18-68). Klaveness discloses that the source that generates the seismic wave paths is located near the drill bit and that the receivers are on the surface. Shook discloses a system for finding pore pressure and making measurements ahead of a drill bit that has the same set up as Klaveness. Shook discloses a source in a borehole and receivers at the surface (Fig. 1). Shook further discloses that the sources/receivers can be switched and that the sources can be at the surface and the receivers in the borehole near the drill bit while still obtaining the same seismic wave paths and recording the same reflections from boundaries ahead of the drill bit ([0035]-[0036]; [0049]-[0050]). It would

have been obvious to modify Klaveness to replace the receivers at the surface with sources and replace the source in the borehole with receivers as disclosed by Shook in order to determine the presence of a gradational pressurized zone ahead of the drill bit prior to drilling into it. In reversing the positions of the source and receivers (sources at surface, receivers in borehole), the travel times and velocities of the reflected waves could be determined by the same methods since the paths and known distances of the equipment would all be the same.

With regard to claim 2, Klaveness discloses transforming the velocity into pore pressure of the formation (Column 9, Line 50 to Column 10).

With regard to claim 3, Klaveness discloses that the drill bit is at substantially the same depth for the different source positions (Fig. 1). Klaveness discloses that there are multiple receivers at the surface. Modifying Klaveness to include sources at the surface in the place of the receivers as taught by Shook would give different source positions with the drill bit at substantially the same position. This would still yield the multiple traces for on drill bit position that is disclosed in Klaveness (Fig. 1).

With regard to claim 4, Klaveness discloses that the seismic waves are generated in the borehole and received at the surface. Shook discloses a system for finding pore pressure and making measurements ahead of a drill bit that has the same set up as Klaveness. Shook discloses a source in a borehole and receivers at the surface (Fig. 1). Shook further discloses that the sources/receivers can be switched and that the sources can be at the surface and the receivers in the borehole near the drill bit while still obtaining the same seismic wave paths and recording the same

reflections from boundaries ahead of the drill bit ([0035]-[0036]; [0049]-[0050]). It would have been obvious to modify Klaveness to replace the receivers at the surface with sources and replace the source in the borehole with receivers as disclosed by Shook in order to determine the presence of a gradational pressurized zone ahead of the drill bit prior to drilling into it. In reversing the positions of the source and receivers (sources at surface, receivers in borehole), the travel times and velocities of the reflected waves could be determined by the same methods since the paths and known distances of the equipment would all be the same.

With regard to claim 5, Klaveness discloses that determining travel times of the seismic waves comprises determining arrival times of the seismic waves reflected from the reflector at the one or more locations (Column 2; Column 7, Lines 15-30; Column 9, Lines 18-68).

With regard to claims 6-7, Klaveness discloses that receiving the seismic waves comprises detecting the seismic waves from at least one seismic receiver at the surface. Modifying Klaveness to reverse the positions of the sources and receivers as taught by Shook would give a receiver in the borehole near the drill bit.

With regard to claim 8, Klaveness discloses that receiving the seismic waves comprises sending a representation of the seismic waves to the surface via telemetry and processing the representation at the surface to determine travel times (Column 2; Column 7, Lines 15-30; Column 9, Lines 18-68; Column 4).

With regard to claim 9, Shook discloses that downhole tools can include processors to process seismic data received at the drill bit ([0050]). It would have been

obvious to modify Klaveness to include processors in the borehole tool so that the information need not be sent back to a central controller at the surface for all of the processing.

With regard to claim 10, Klaveness discloses a system for estimating velocity ahead of a drill bit disposed in a subsurface formation (Fig. 1, Columns 2-4). Klaveness discloses generating seismic waves in the borehole and receiving these seismic waves at the surface (Fig. 1) (Column 2; Column 7, Lines 15-30; Column 9). Klaveness discloses determining travel times of the seismic waves received at the one more locations (Column 2; Column 7, Lines 15-30; Column 9, Lines 18-68). Klaveness discloses that the source that generates the seismic wave paths is located near the drill bit and that the receivers are on the surface. Shook discloses a system for finding pore pressure and making measurements ahead of a drill bit that has the same set up as Klaveness. Shook discloses a source in a borehole and receivers at the surface (Fig. 1). Shook further discloses that the sources/receivers can be switched and that the sources can be at the surface and the receivers in the borehole near the drill bit while still obtaining the same seismic wave paths and recording the same reflections from boundaries ahead of the drill bit ([0035]-[0036]; [0049]-[0050]). It would have been obvious to modify Klaveness to replace the receivers at the surface with sources and replace the source in the borehole with receivers as disclosed by Shook in order to determine the presence of a gradational pressurized zone ahead of the drill bit prior to drilling into it. In reversing the positions of the source and receivers (sources at surface, receivers in borehole), the travel times and velocities of the reflected waves could be

determined by the same methods since the paths and known distances of the equipment would all be the same.

With regard to claim 11, Klaveness discloses that the drill bit is at substantially the same depth for the different source positions (Fig. 1). Klaveness discloses that there are multiple receivers at the surface. Modifying Klaveness to include sources at the surface in the place of the receivers as taught by Shook would give different source positions with the drill bit at substantially the same position. This would still yield the multiple traces for on drill bit position that is disclosed in Klaveness (Fig. 1).

With regard to claim 12, Klaveness discloses a processor for transforming the velocity into pore pressure of the formation (Column 9, Line 50 to Column 10).

With regard to claim 13, Klaveness discloses a tool that determines arrival times of seismic waves detected by the seismic receiver (Columns 2, 4; Column 7, Lines 15-30; Column 9).

With regard to claim 14, Klaveness discloses that the processor is further adapted to process instructions for determining the travel times from the arrival times (Columns 2, 4; Column 7, Lines 15-30; Column 9).

With regard to claim 15, Klaveness discloses that the seismic receivers are located at the surface and that the borehole tool is a seismic source. Modifying Klaveness to reverse the positions of the sources and receivers as taught by Shook would give a receiver in the borehole near the drill bit.

With regard to claim 16, Shook discloses that the seismic receiver is disposed on a drill string (Fig. 1) ([0035]). It would have been obvious to modify Klaveness to

include the receiver disposed on the drill string as taught by Shook for the reasons stated above in the rejection of claim 10.

With regard to claim 18, Klaveness discloses a method of estimating velocity ahead of a drill bit disposed in a subsurface region (abstract; Column 2). Klaveness discloses obtaining surface seismic data for a region of interest. Klaveness discloses determining a travel time of a seismic wave generated from a borehole to receivers at the surface when the drill bit is at selected depths in the borehole during drilling of a borehole traversing the subsurface region (Column 2; Column 6; Column 7, Lines 15-30; Column 9). Klaveness discloses determining a velocity from the travel time and the selected depths. Klaveness discloses inverting the surface seismic data to determine a velocity ahead of the drill bit while constraining velocity between the surface and the drill bit to be consistent with the velocity determined from the travel time ((Column 2, Column 7, Lines 15-30; Columns 9-10). Klaveness discloses that the source that generates the seismic wave paths is located near the drill bit and that the receivers are on the surface. Shook discloses a system for finding pore pressure and making measurements ahead of a drill bit that has the same set up as Klaveness. Shook discloses a source in a borehole and receivers at the surface (Fig. 1). Shook further discloses that the sources/receivers can be switched and that the sources can be at the surface and the receivers in the borehole near the drill bit while still obtaining the same seismic wave paths and recording the same reflections from boundaries ahead of the drill bit ([0035]-[0036]; [0049]-[0050]). It would have been obvious to modify Klaveness to replace the receivers at the surface with sources and replace the source in the

borehole with receivers as disclosed by Shook in order to determine the presence of a gradational pressurized zone ahead of the drill bit prior to drilling into it. In reversing the positions of the source and receivers (sources at surface, receivers in borehole), the travel times and velocities of the reflected waves could be determined by the same methods since the paths and known distances of the equipment would all be the same.

With regard to claim 19, Klaveness discloses transforming the velocity ahead of the drill bit into pore pressure of a region ahead of the drill bit (Column 9, Lines 50-55).

With regard to claims 20-22, Klaveness discloses generating seismic waves at the drill bit and receiving them with receivers at the surface (Fig. 1). Klaveness further discloses a reference sensor E near the opening of the borehole. Shook discloses reversing the sources and receivers to have sources at the surface and receivers in the borehole. It would have been obvious to modify Klaveness to have surface sources including one near the opening of the borehole where the reference sensor is positioned and to have receivers in the borehole near the drill bit (where the source in Klaveness is located) as taught by Shook in order to generate and receive waves that give information of the formation ahead of the bit.

With regard to claim 23, Klaveness discloses that determining the travel time further comprises measuring the arrival time of the seismic wave detected at the seismic receiver and determining the travel time from the arrival time (Column 2, Column 7, Lines 15-30; Columns 9-10).

With regard to claim 24, Klaveness discloses that measuring the arrival time comprises sending the seismic wave detected in the borehole to the surface and

processing the detected wave at the surface to determine arrival time (Column 2; Column 7, Lines 15-30; Column 9, Lines 18-68; Column 4).

With regard to claim 25, Shook discloses that downhole tools can include processors to process seismic data received at the drill bit ([0050]). It would have been obvious to modify Klaveness to include processors in the borehole tool so that the information need not be sent back to a central controller at the surface for all of the processing.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Klaveness in view of Shook as applied to claims 10-16 above and further in view of Robbins.

With regard to claim 17, Robbins discloses a clock for synchronizing, generating, and detecting the seismic waves (Columns 3 and 4). It would have been obvious to modify Klaveness to include a clock as disclosed by Robbins in order to determine monitor the precise times the source was fired and the precise time the signal was received.

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

JACK KEITH
PRIMARY EXAMINER
SPE 3663